

General Guidance for Generative Components in OBM

Note, the following guidance may change as technology developments occur with the CADD modeling software and its use affecting workflows for project development.

This is general guidance that is used for Iowa DOT Custom Abutments when they are placed in OpenBridge Modeler (OBM) using Generative Component (GC) abutments. Previously, Custom Abutments were placed with Functional Component (FC) Abutments that were parametric cells, these are phased out and replaced with Generative Component (GC) Abutments.

Prior to placing a Generative Component (GC) custom abutment into an OBM structure, it is recommended to make as many superstructure entries as possible first, such as deck adjustments, beam haunch and camber, beam bearing and seat height using a basic OBM delivered abutment with the appropriate top of abutment footing settings for the structure. This would aid in providing beam bearing seat (step) thickness values used in GC node inputs. By doing this, it will optimize the GC vertical location upon initial placement in the bridge model. Any vertical and horizontal offsets of the abutments can be made in the “Rule Property” settings after the GC is placed.

This document will provide basic guidance for the following information:

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The additional GC-Inputs Abutment documents to be used along with this document are listed below.

[GC-Inputs-CCS-Abutment](#)

[GC-Inputs-Integral-Abutment](#)

[GC-Inputs-Slab Abutment](#)

Set-up of OBD/OBM Shortcut to enable use of Generative Component (GC) custom abutment

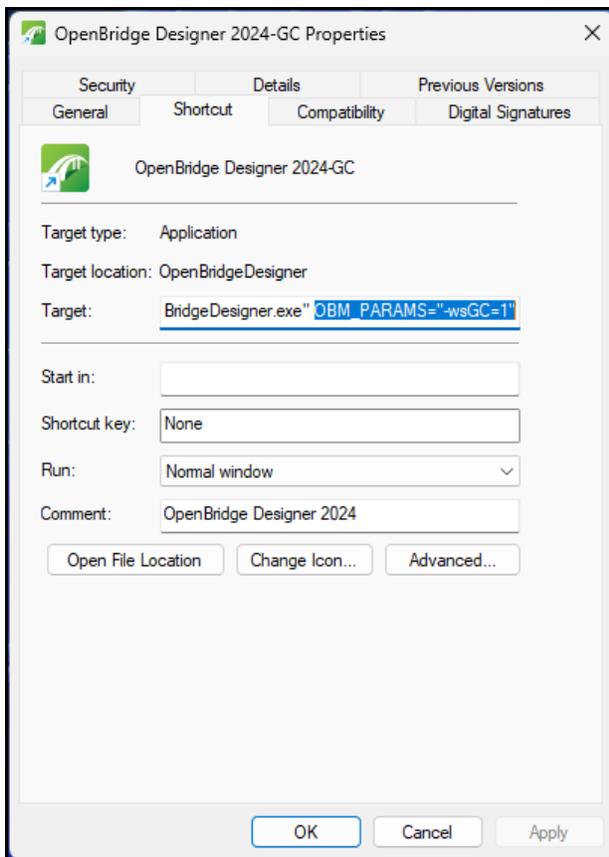
When working with a Generative Component (GC) custom abutment, if using OpenBridge Designer (OBD) or OpenBridge Modeler(OBM) a shortcut needs to be created with the following text appended to the software executable path. This will open an OBM file enabling the use of GC's by adding the "Computational Design" Workflow capabilities.

For OBD, append shortcut with the following:

OBM_PARAMS="-wsGC=1"

The following image shows the shortcut for OBD 2024 version, Update 2.

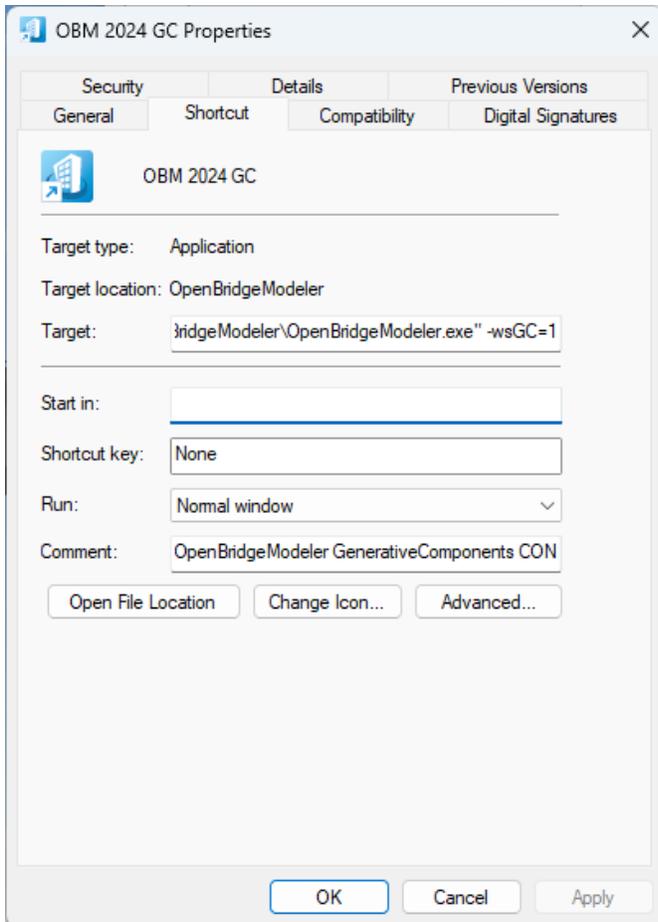
"C:\Program Files\Bentley\OpenBridge Designer 2024.00\OpenBridgeDesigner\OpenBridgeDesigner.exe" OBM_PARAMS="-wsGC=1"



For OBM, append shortcut with the following:

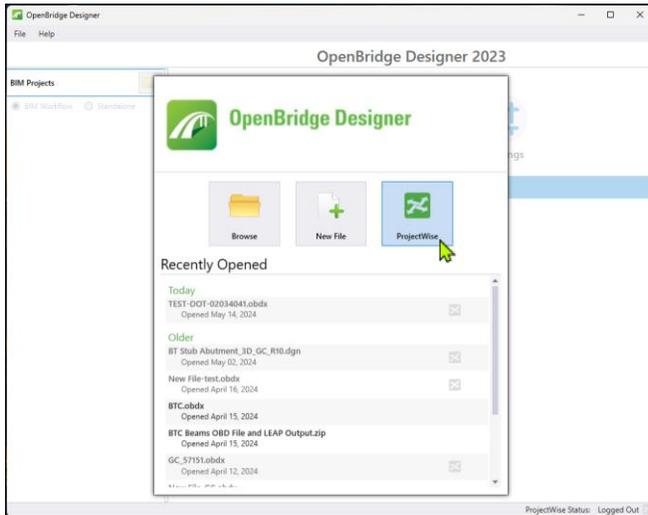
-wsGC=1

The following image shows the shortcut for OBM 2024

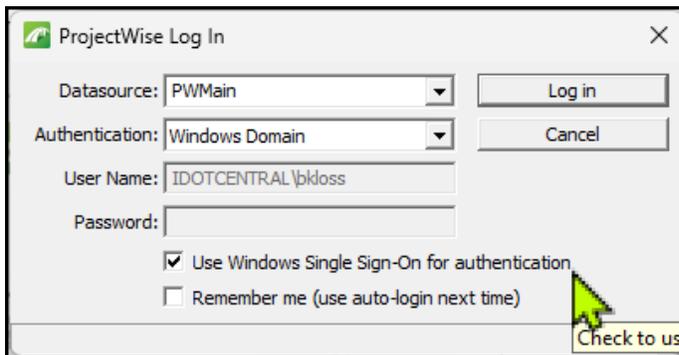


"C:\Program Files\Bentley\OpenBridge Modeler 2024.00\OpenBridgeModeler\OpenBridgeModeler.exe" -wsGC=1

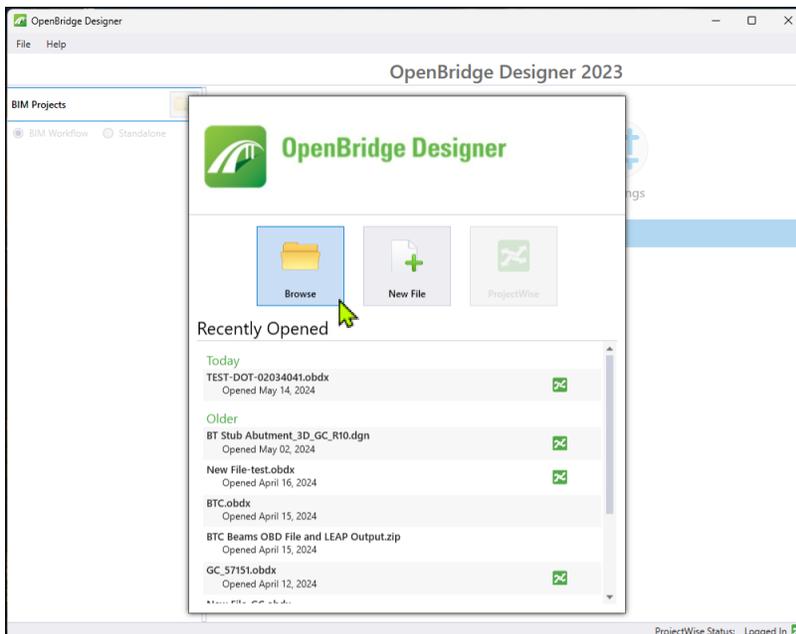
Connect to ProjectWise (PW) through the Desktop OpenBridge Designer.



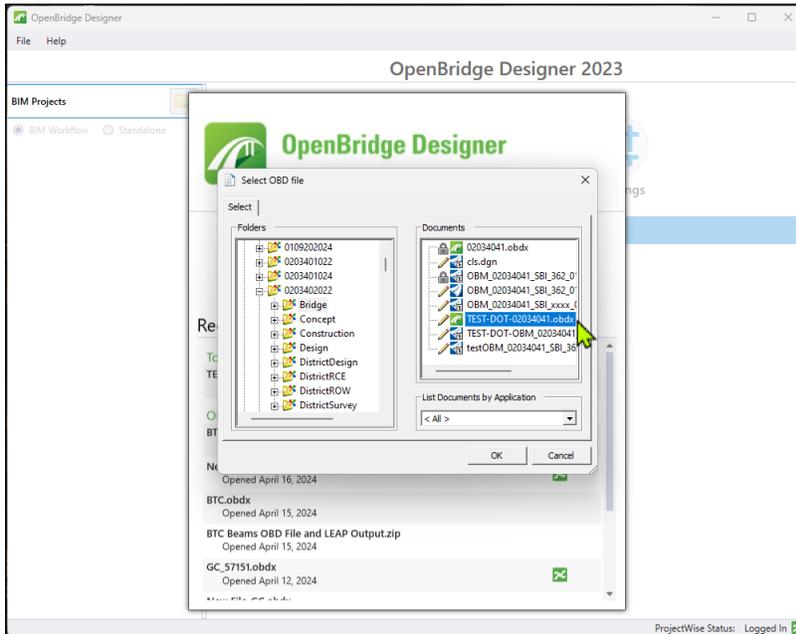
Log In to PW.



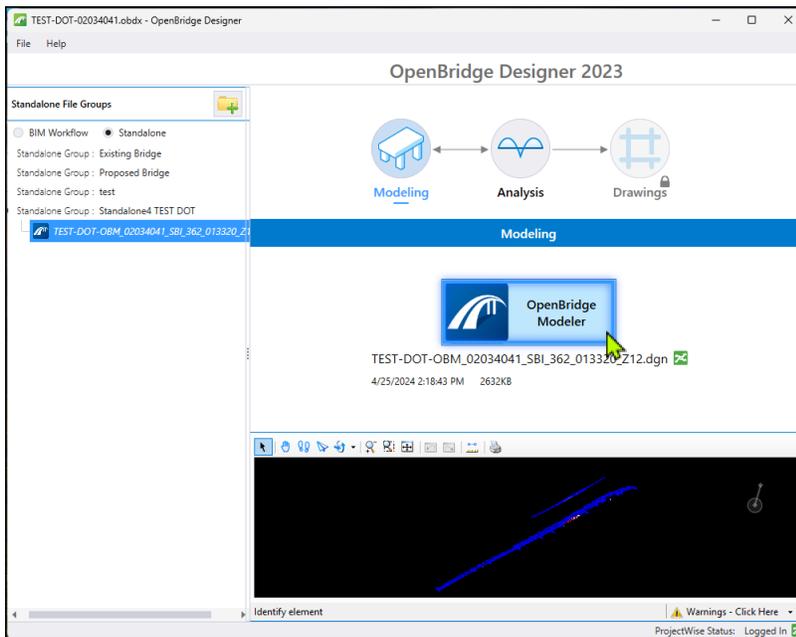
Browse to the existing project .obdx file in PW.



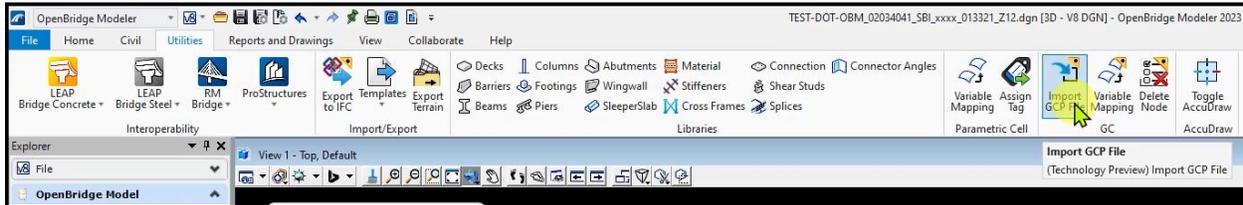
Browse to the existing project .obdx file in PW and select OK.



Select and open the existing OBM file.

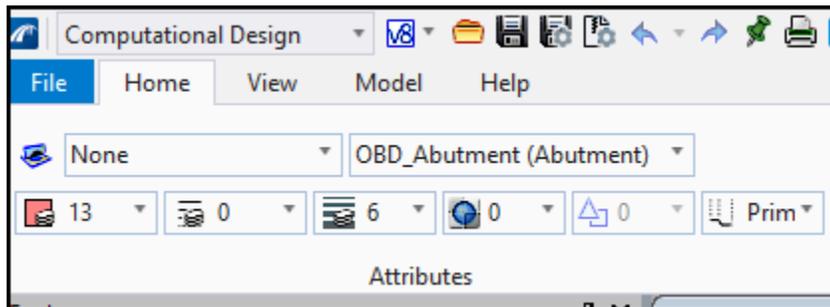


In the ribbon with the workflow set to **OpenBridge Modeler**, under the **Utilities** tab, select **Import GCP File** in the **GC** group.



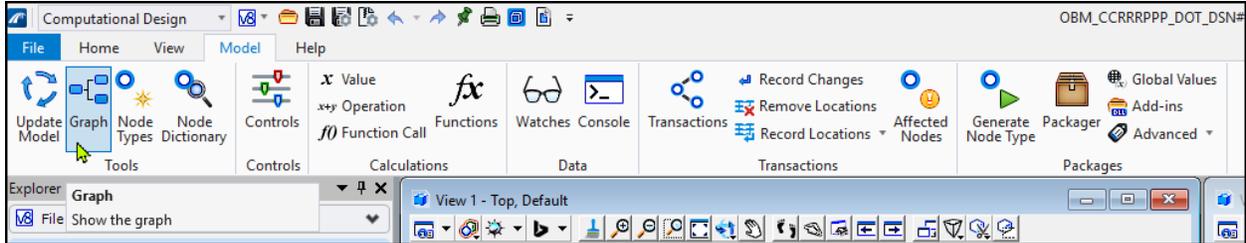
To continue to place the GC abutment see the relevant GC abutment document to use for each GC abutment type.

Note, when placing GC abutments, the element properties (visual attributes) that are applied are dependent on what the active element attributes are set at during the time of placement. When the GC abutment is modified using the Inputs through the Computational Design workflow, the element properties will again use what the active element attributes are set at.

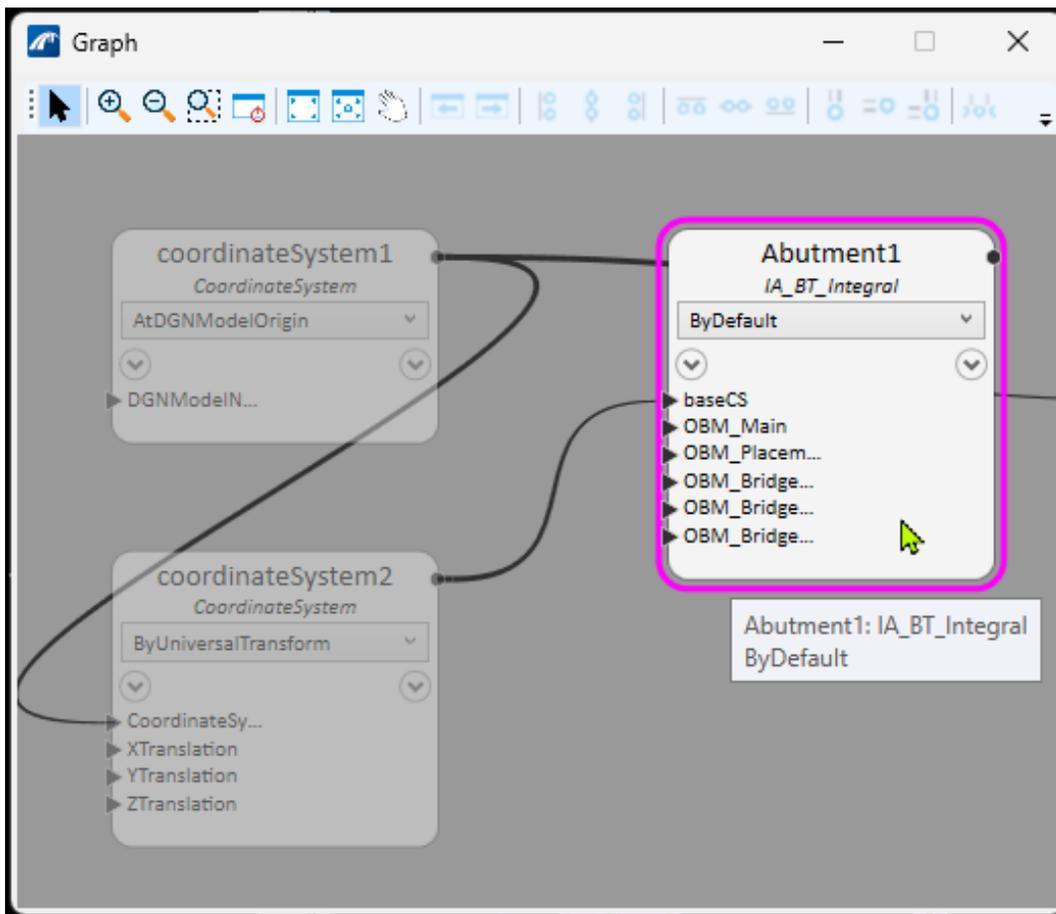


Renaming a GC Custom Abutment once placed in OBM.

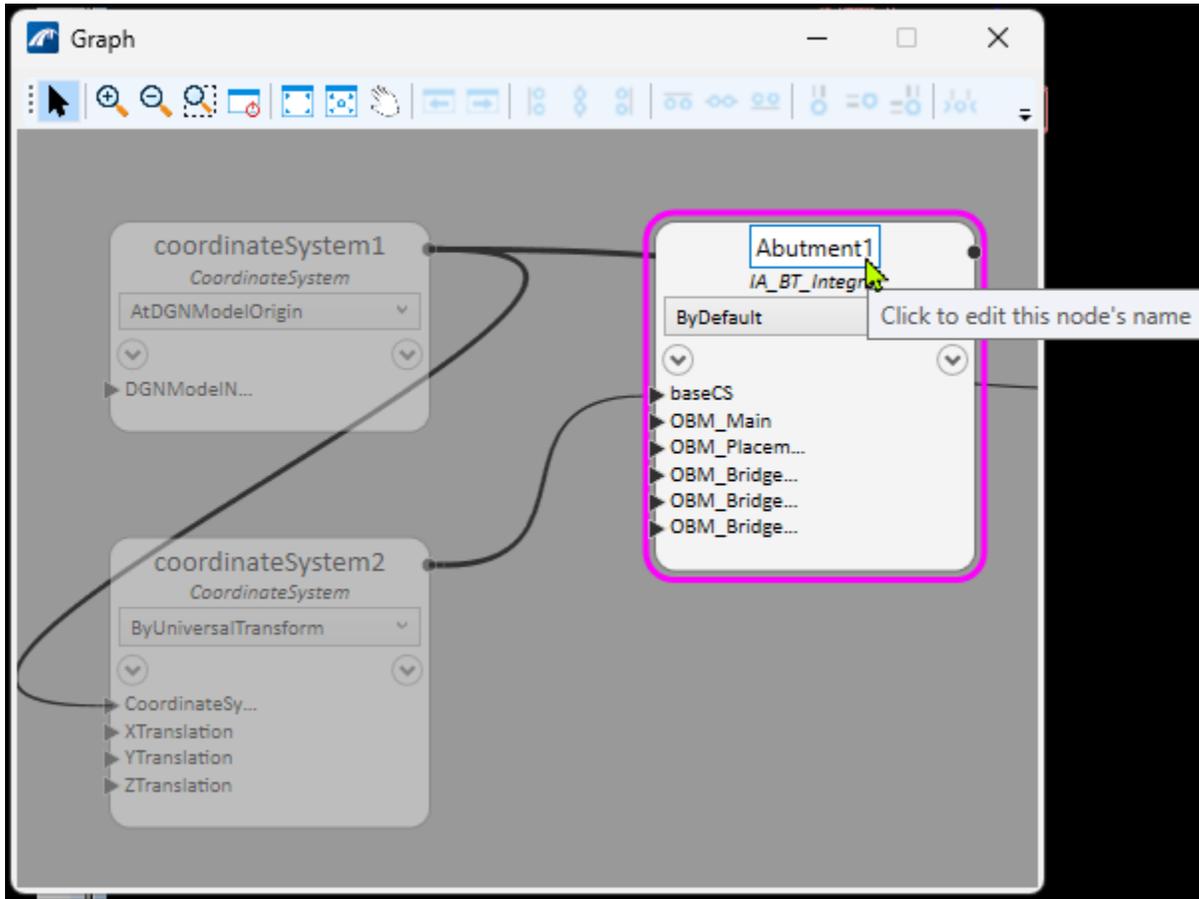
Once the GC custom abutment is placed, in the ribbon change the workflow to **Computational Design** and under the **Model tab**, select **Graph**. Selecting “Graph” will enable the process of editing of the GC abutment geometry and name. These tools are also located under the **Home tab**.



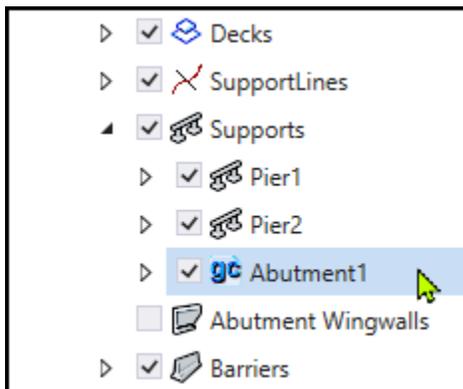
The Graph dialog box will appear, the “Abutment1” box in this example was auto-labeled “Abutment1” *IA_BT_Integral* in the OBM model. Double-clicking the selected “Abutment1” graph dialog box will open the Node Properties dialog to enable the process of editing of the GC abutment geometry. Editing the Node Properties is covered in the CG-Inputs Abutment Documents specific to each abutment type.



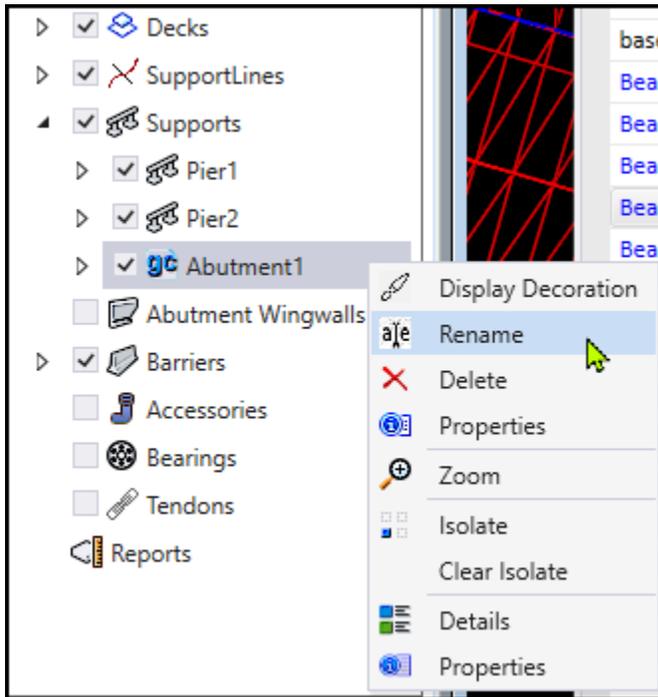
In the GC Graph dialog box, select the “Abutment1” text to rename the abutment. Use a logical name.



Additionally, the GC abutment will need to be renamed in the OpenBridge Model Explorer tree. This should match the name used in the GC Graph dialog box. In this example, OBM has labeled the Generative Component Custom Abutment as “Abutment1”.

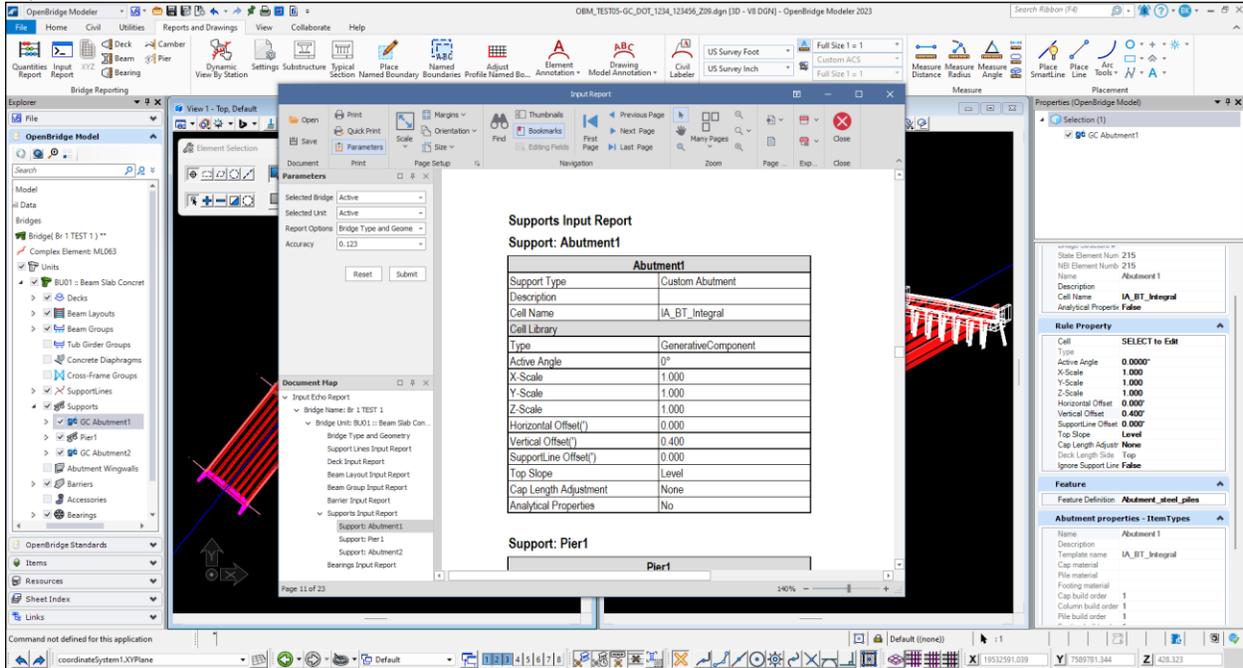


The OBM Supports “GC Abutment1” can be renamed in the OBM structure tree. Renaming in the OBM structure tree does not appear to carry over and rename the Generative Component from the “auto-generated” name of “Abutment1”.

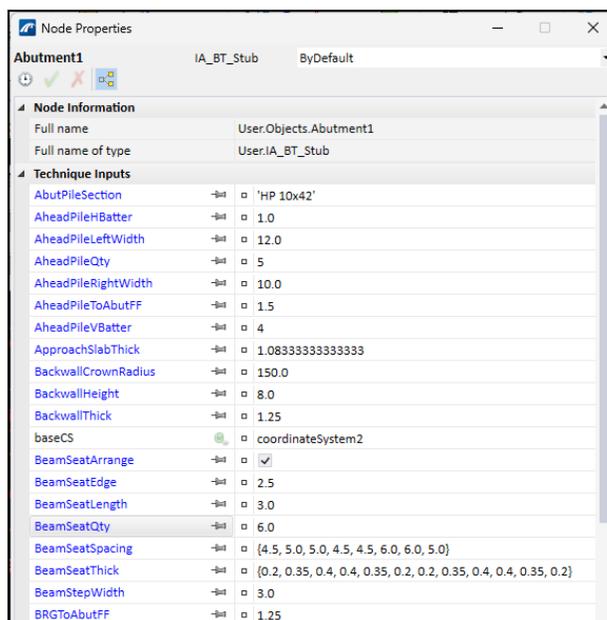


Input Report showing output when Custom Abutments are used.

OBM Input Report on GC Abutments only reports on the Rule Properties that are set for each abutment. It does not provide reports on the individual variables, Technique Inputs, set for each abutment. When creating an Input Echo Report of the OBM file for project records, the GC abutments only provide basic Rule Property information. It is recommended to save a “screen shot” of the Node Properties/Technique Inputs used for each GC abutment used in the OBM file.



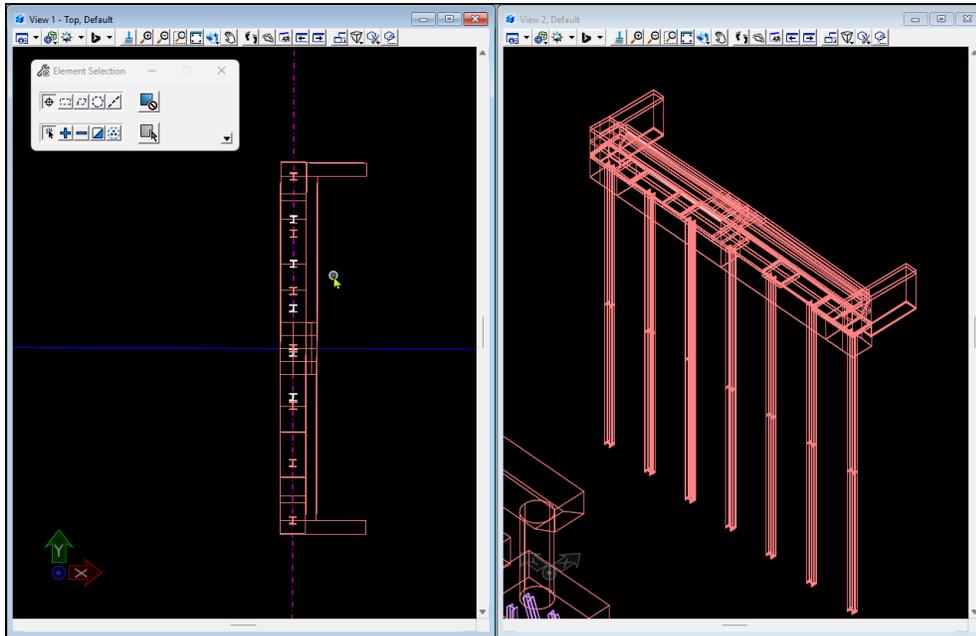
The image below shows an example, partial list, of Technique Inputs edited in the Node Properties of a GC abutment once placed in OBM. This is used to edit the geometry of each type of GC abutment. The Technique Inputs are specific to each individual abutment and type. **It is recommended to save a “screen shot”, or other form of record, of this Node Properties/Technique Inputs used for each GC abutment used in the OBM file.**



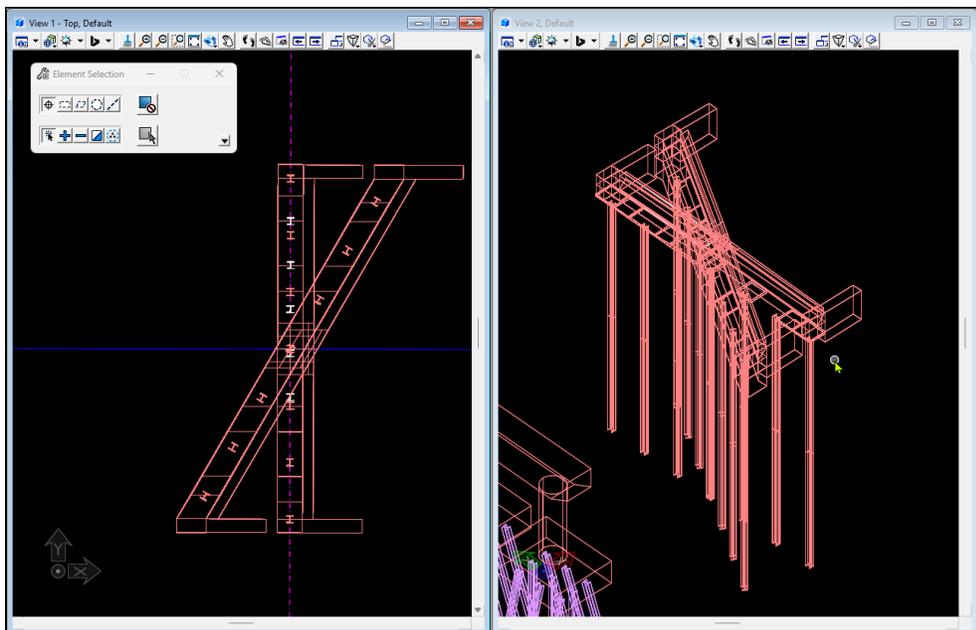
Rebuilding an existing GC abutment that may have broken or static elements.

This is needed when wanting to rebuild a GC abutment that may have remnants or portions of the shapes that become static copies of the original. These static elements may have the same or different colors as the original elements.

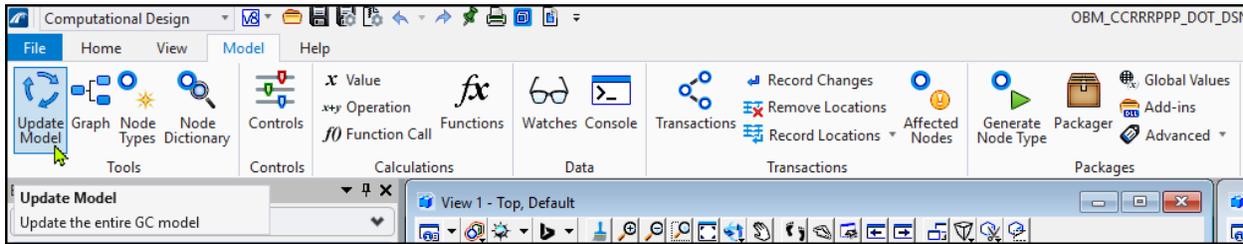
The example image below shows a GC abutment along with static elements may have the same or different colors as the original elements. In this image the static elements may not appear obviously different than the active GC elements. Some static elements may overlay, or be offset from, the active GC managed elements.



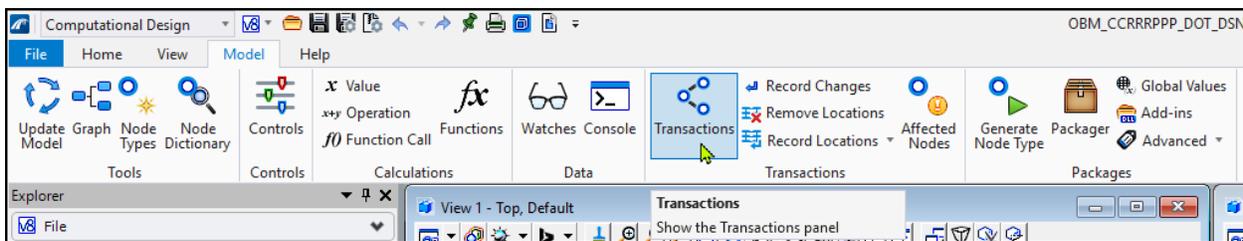
The example image below shows the GC abutment with a skew change. This is to visualize the difference of the static elements that do not move when the GC is changed.



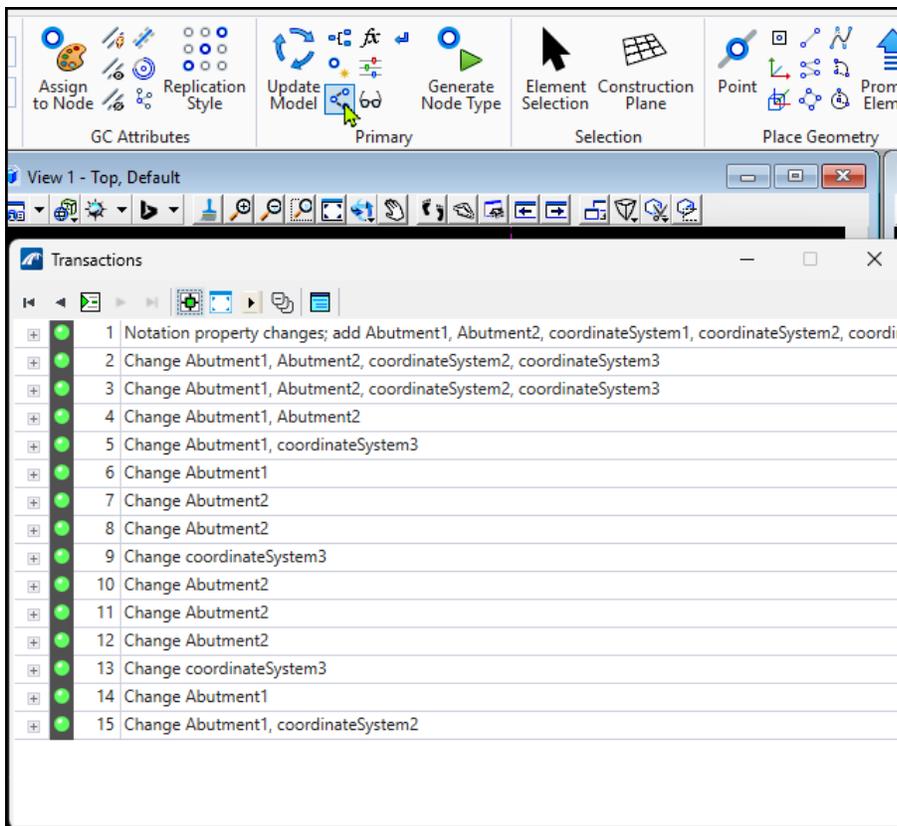
First, try using the **Update Model** tool in the **Computational Design workflow** under the **Model tab** of the ribbon to see if this fixes the broken static elements. If this does not work, then re-running the “Transactions” is the next process to try. These tools are also located under the **Home tab**.



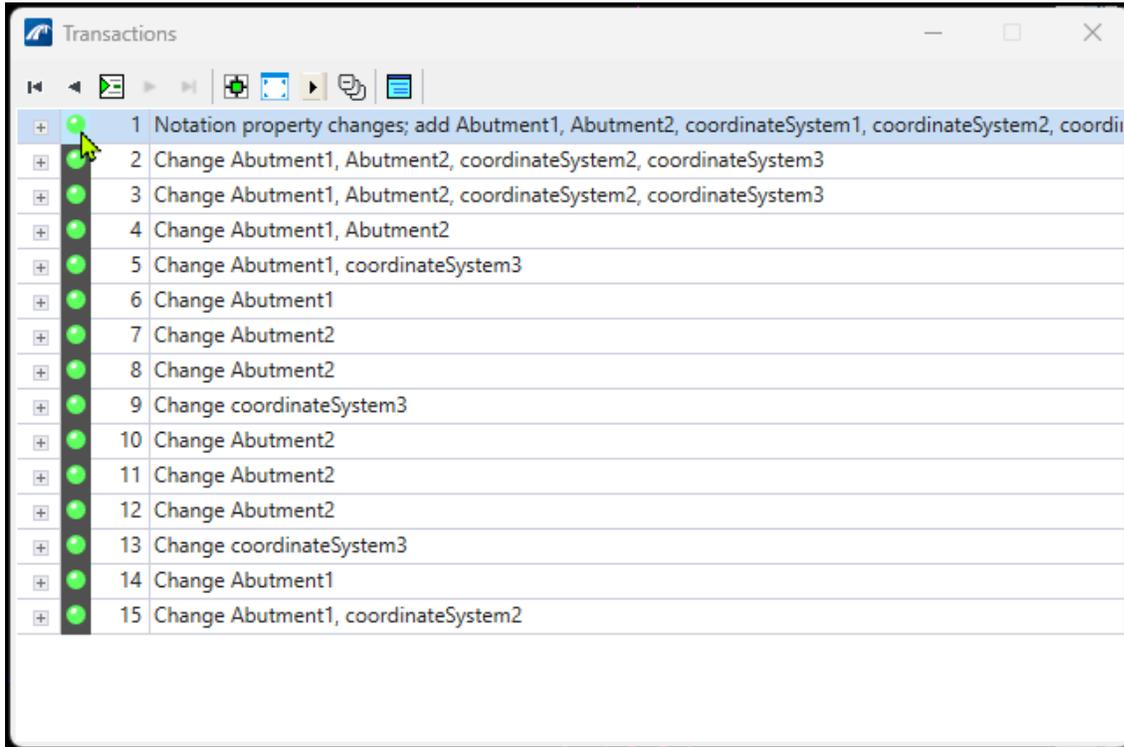
The **Transactions** tool is in the **Computational Design workflow** under the **Model tab** of the ribbon.



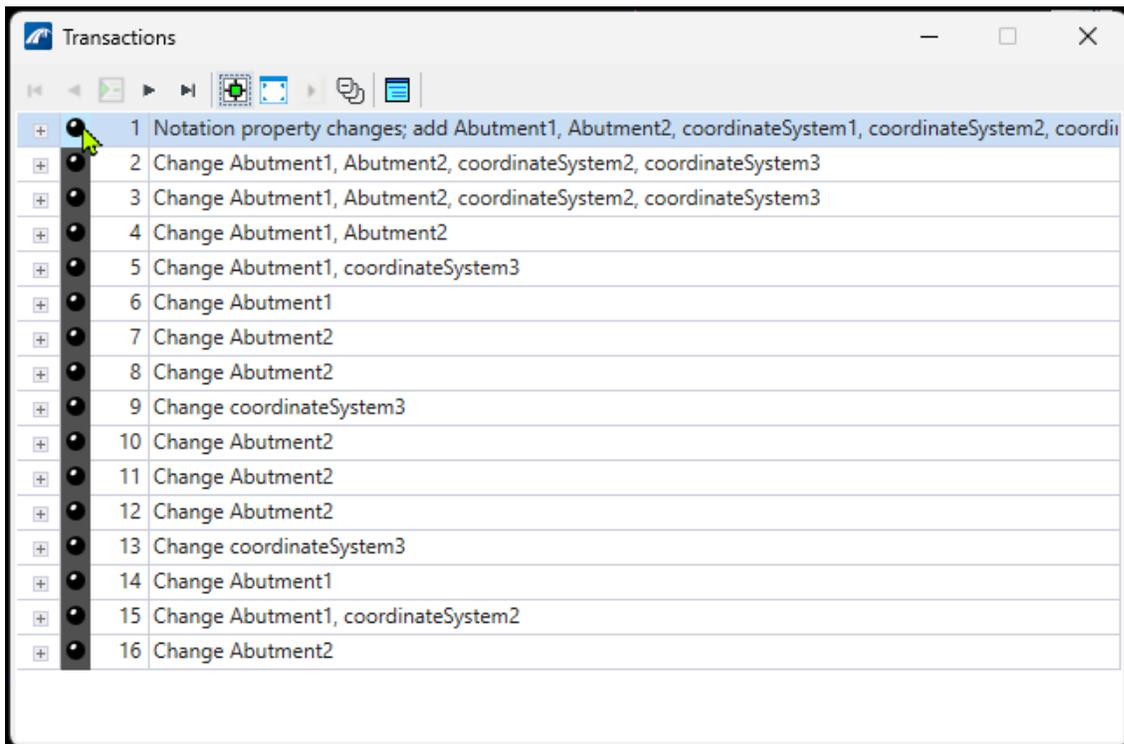
Selecting “Transactions” opens the following dialog box.



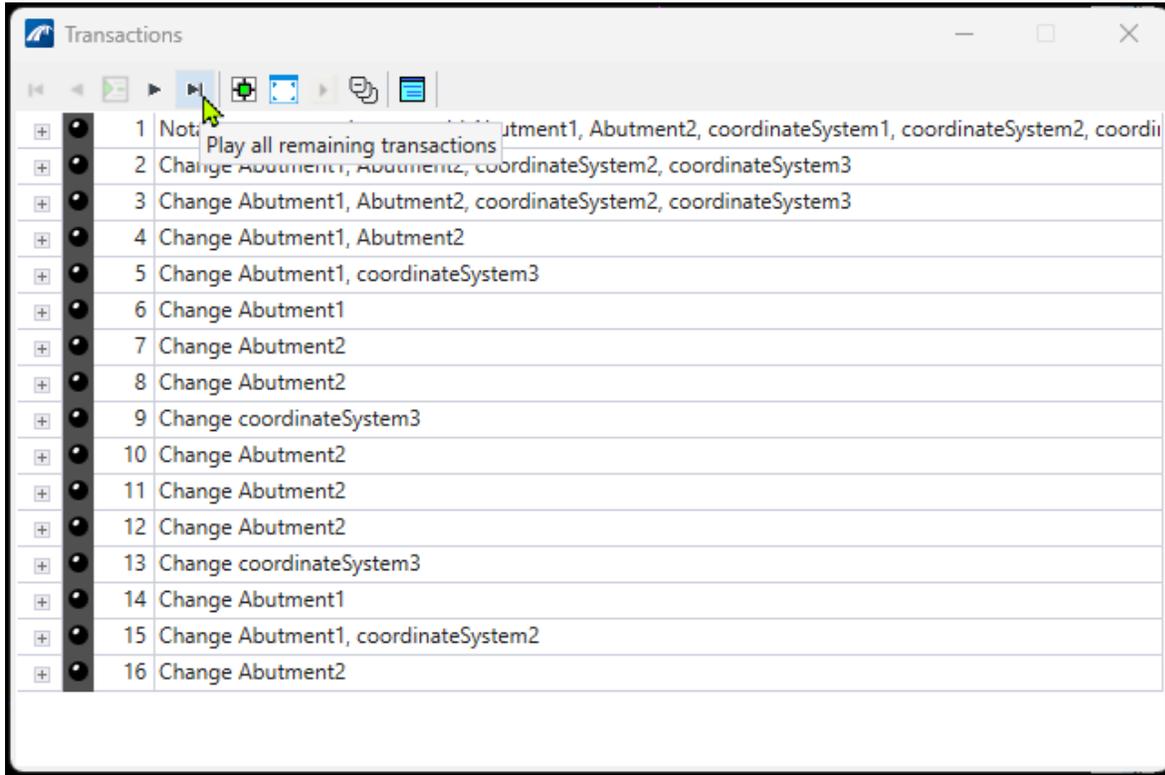
Turn off, left click, the top transaction button. This will turn off all transactions below it. This will remove all GC's that are in the model. The following steps will rebuild all GC's that are in the model.



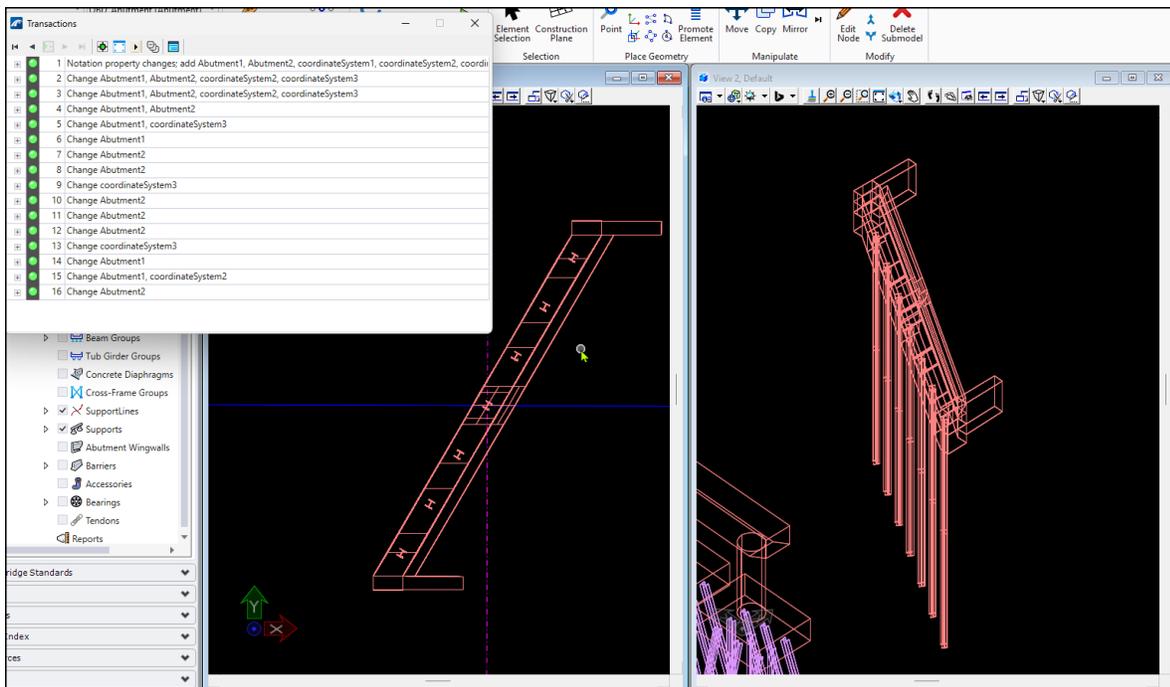
Turning off the top transaction button will turn off all transactions below it.



Select the “Play all remaining transactions” tool will replay/re-run all transactions and rebuild the GC abutments. This will rebuild all GC’s that are in the model.



The example image below is showing the rebuilt GC’s that are in the model with the broken static elements removed.

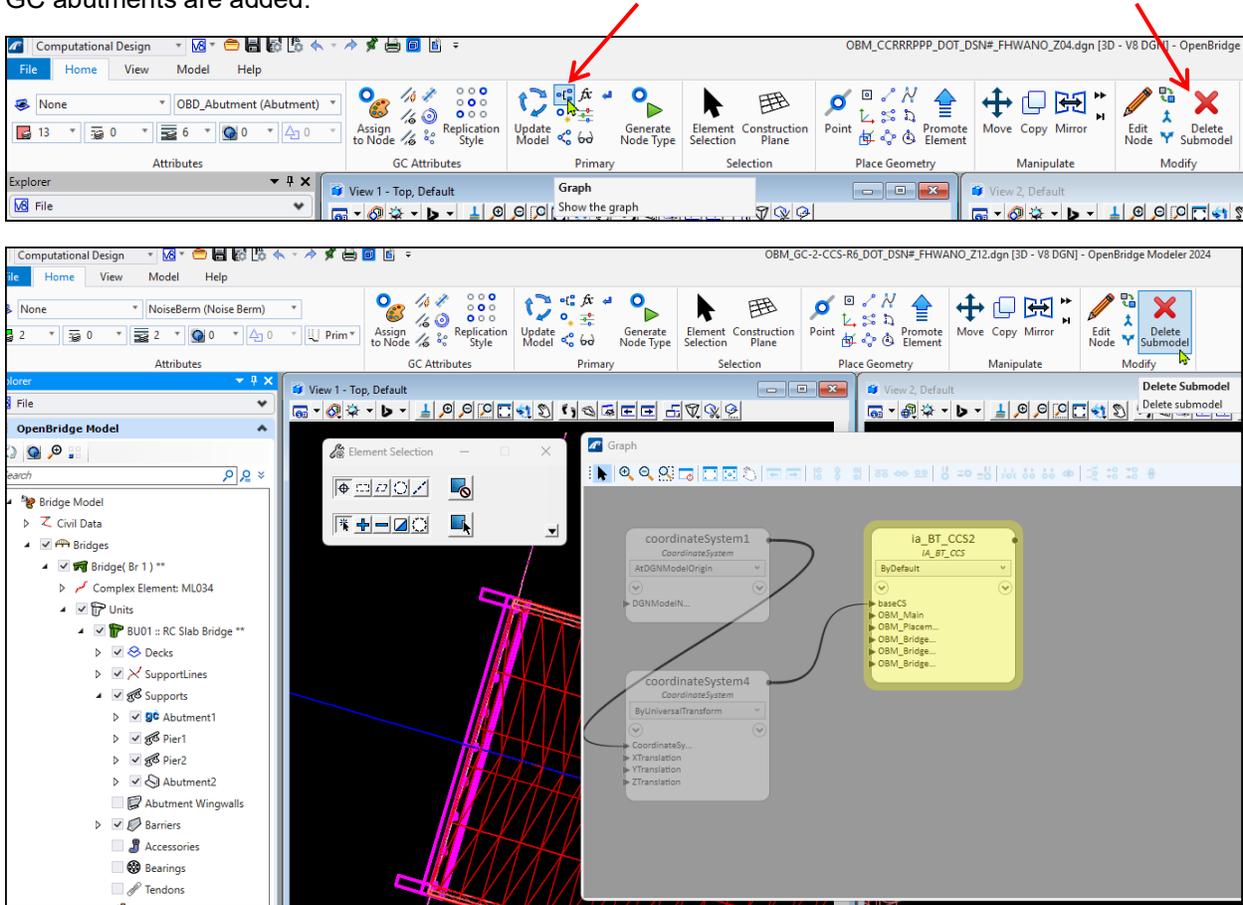


Removing existing GC and GC-Package (gcp) files from an OBM file.

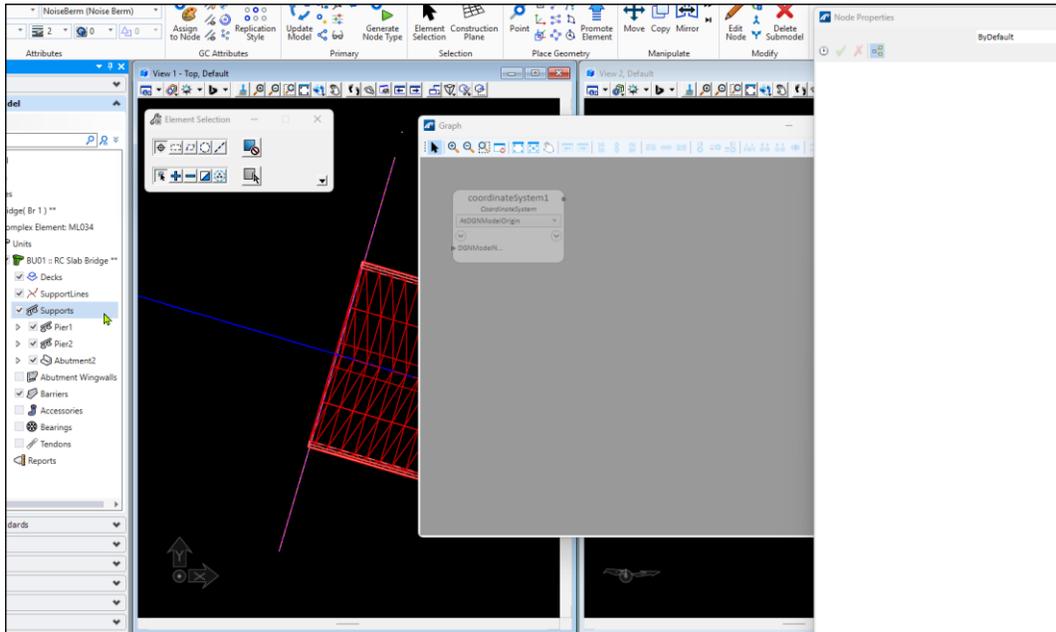
This is needed when wanting to replace an existing GC abutment and existing gcp file used with that abutment, for an updated gcp file used for an updated or different GC abutment. **This is necessary when the existing and replacement GC abutments are the same name.**

In the Ribbon, set the workflow to **Computational Design**, use the following steps.

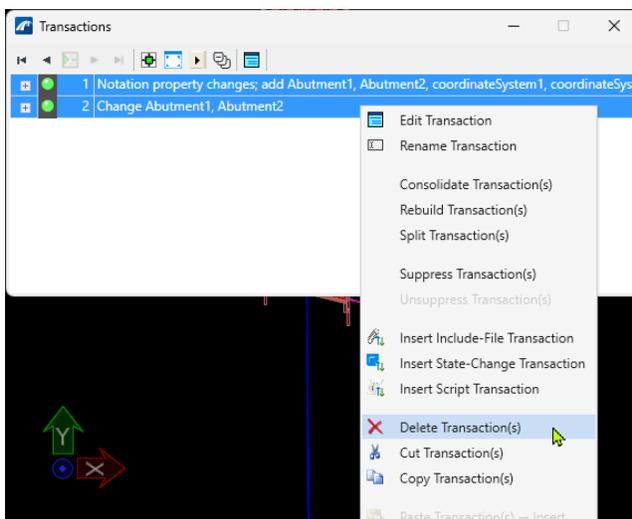
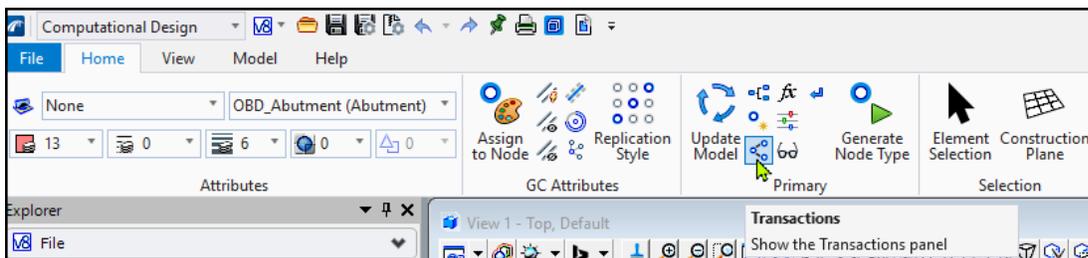
In the **Home tab** of the Ribbon, select the **Graph** tool to open the Graph dialog and select the GC abutment for deletion. In the **Home tab** of the Ribbon, use the **Delete Submodel** tool. If deleting both abutments, delete all Graph Submodels, including CoordinateSystem. New ones will be created when GC abutments are added.



The GC abutment should now appear removed from the bridge model.



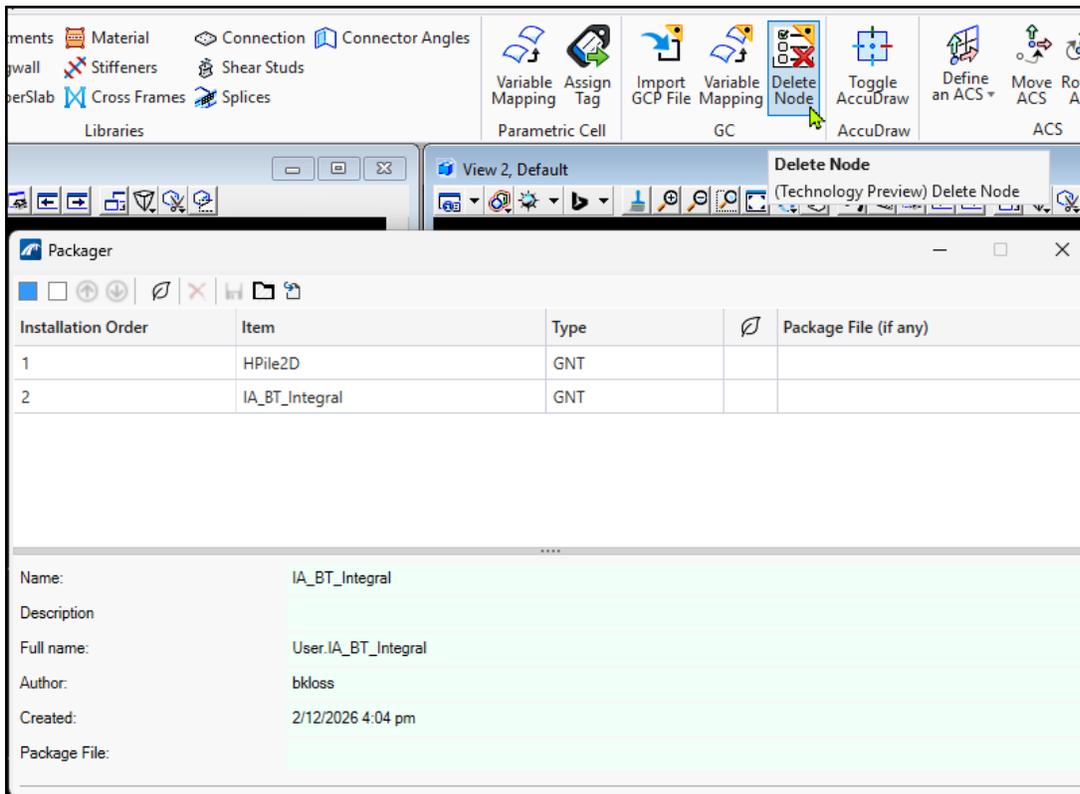
Next, while in **Computational Design** workflow, in the **Home** tab of the Ribbon, select the **Transactions** tool to open the dialog box and ensure the transactions that are recorded when using the GC abutments are deleted. Select/highlight all Transactions, right-click and select "Delete Transaction(s)" to remove all remnants of the GC abutment that is to be deleted.



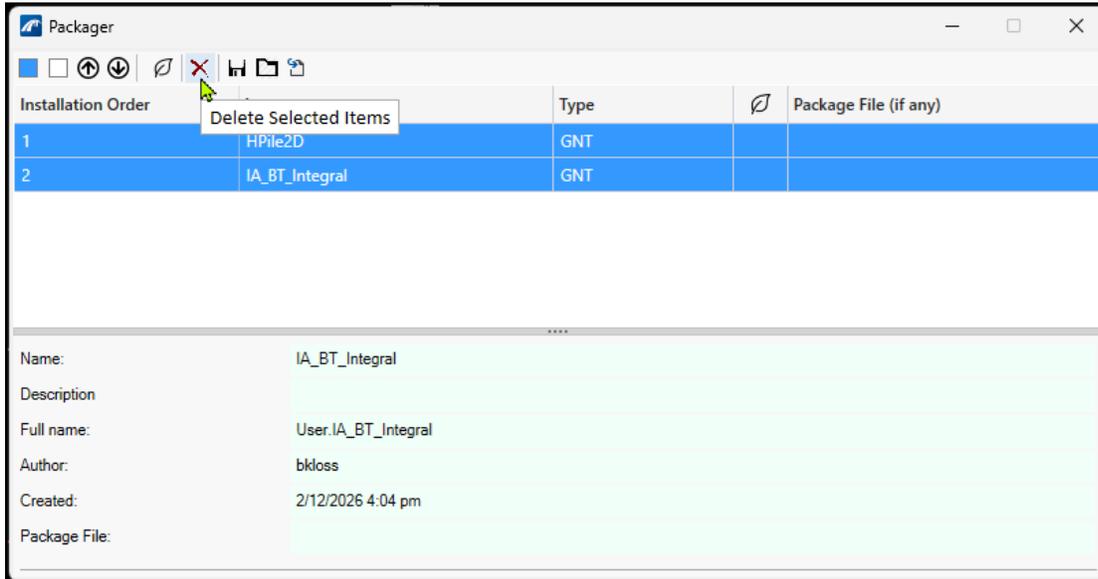
In the Ribbon, set the workflow to **OpenBridge Modeler**, select the **Utilities** tab, select **Delete Node** in the GC group of the ribbon.



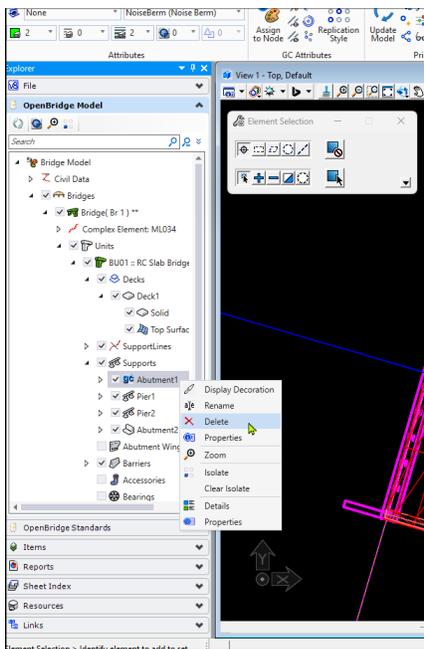
The following Packager dialog box will display.



Select the existing GC “Items” that are in the list, select “Delete Selected Items” to remove them from the OBM file. This will now allow the updated GC-abutment to be placed in the OBM file.

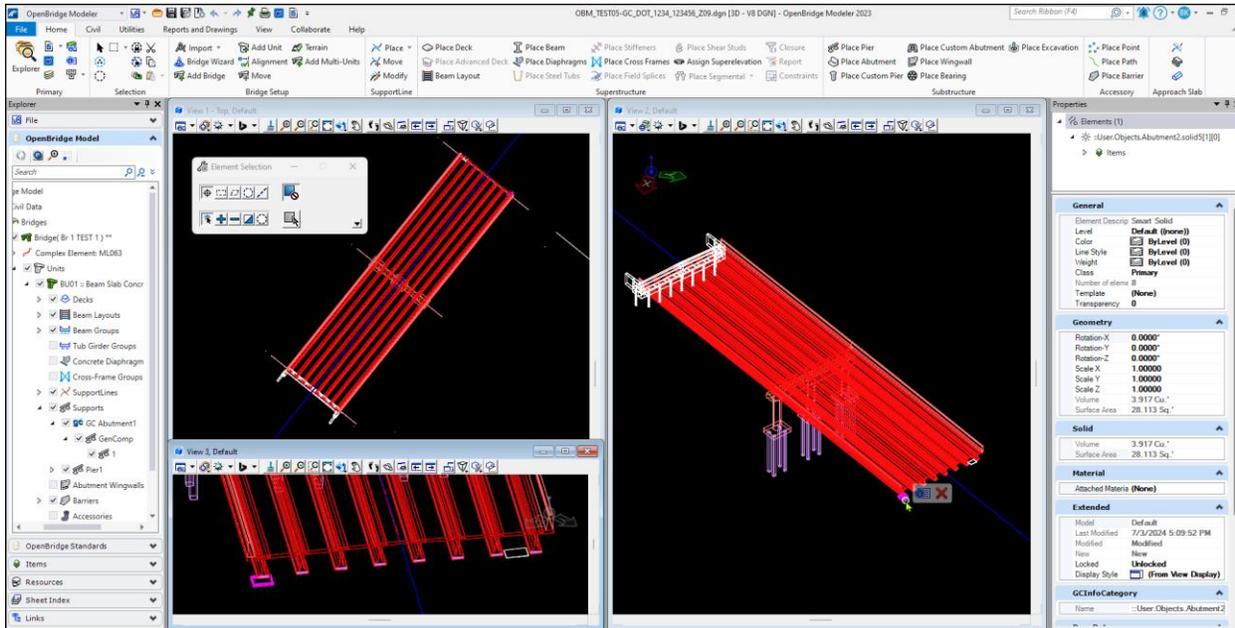


In the OpenBridge Model explorer tree, if the deleted GC abutment is still visible, select the “gc Abutment” in the OBM Supports, right click, select “Delete”.



After completing the removal/deletion of the GC Package files, then the new/replacement GC Package (gcp) file may be installed using the “Import GCP File” and “Variable Mapping” steps.

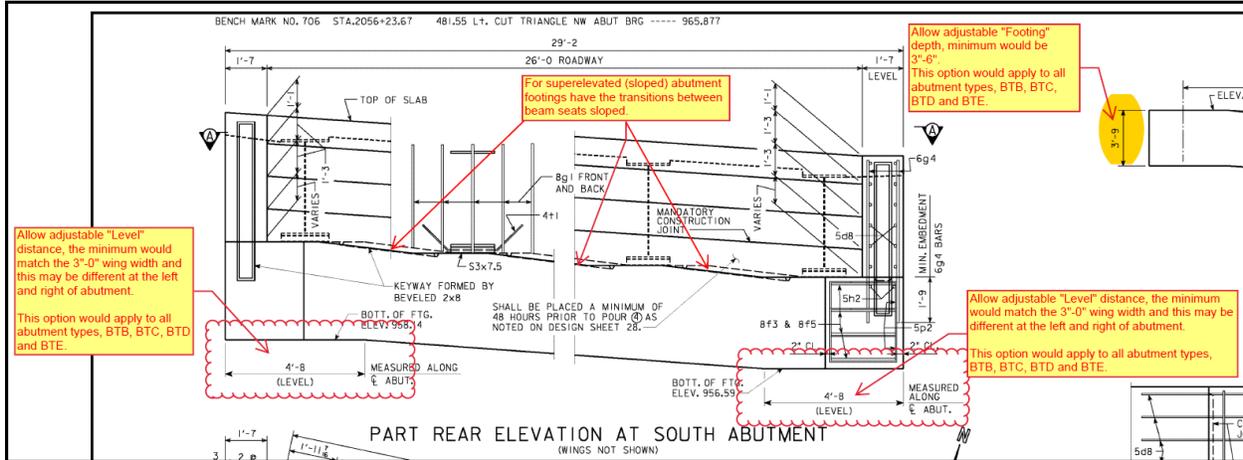
Occasionally, when a GC abutment is deleted while in Computational Design of OBM, sometimes there are remnant solids that are not deleted. It may be necessary to re-open OBM without GC (Computational Design) and then the remnant solids can be deleted.



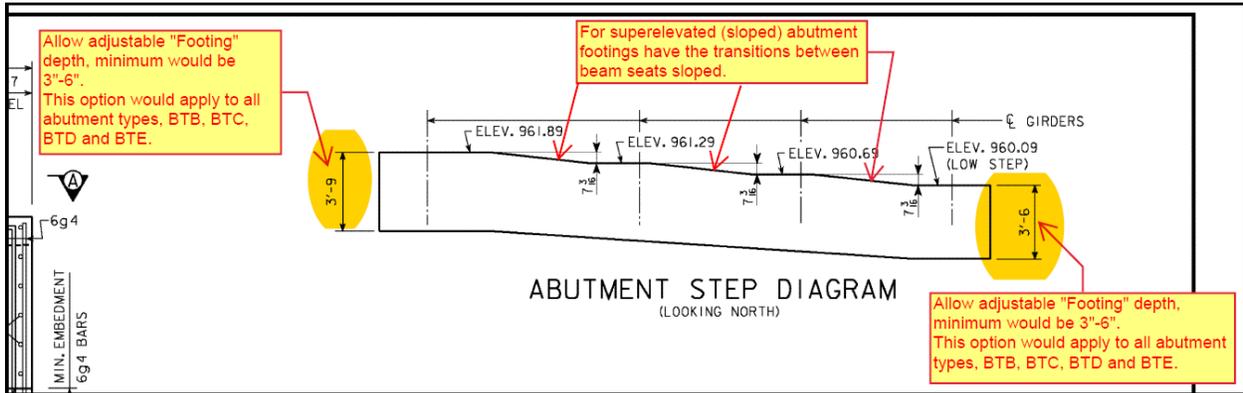
Example scenarios for superelevated (sloped or stepped) substructures.

The following is for general information. This shows past scenarios of abutment geometry used on superelevated bridges. The current GC abutments used for superelevated sloped integral abutment footings have the transition between beam seats "sloped" as shown in the images below.

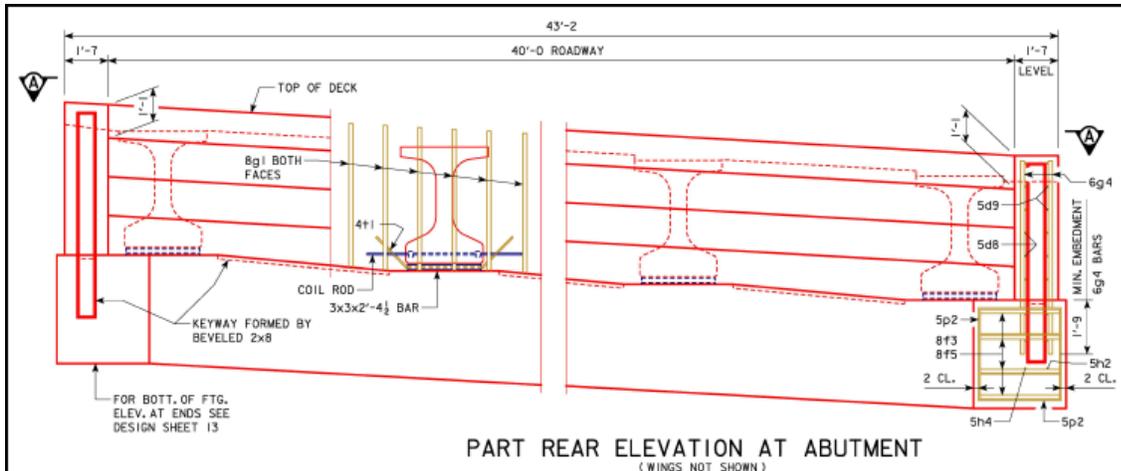
Sloped Integral Abutment Example - Sloped bearing steps (beam seats) for sloped footing only.



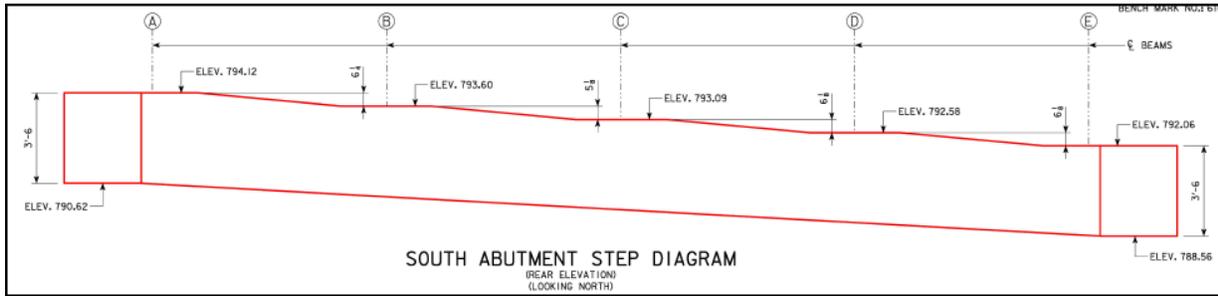
Sloped



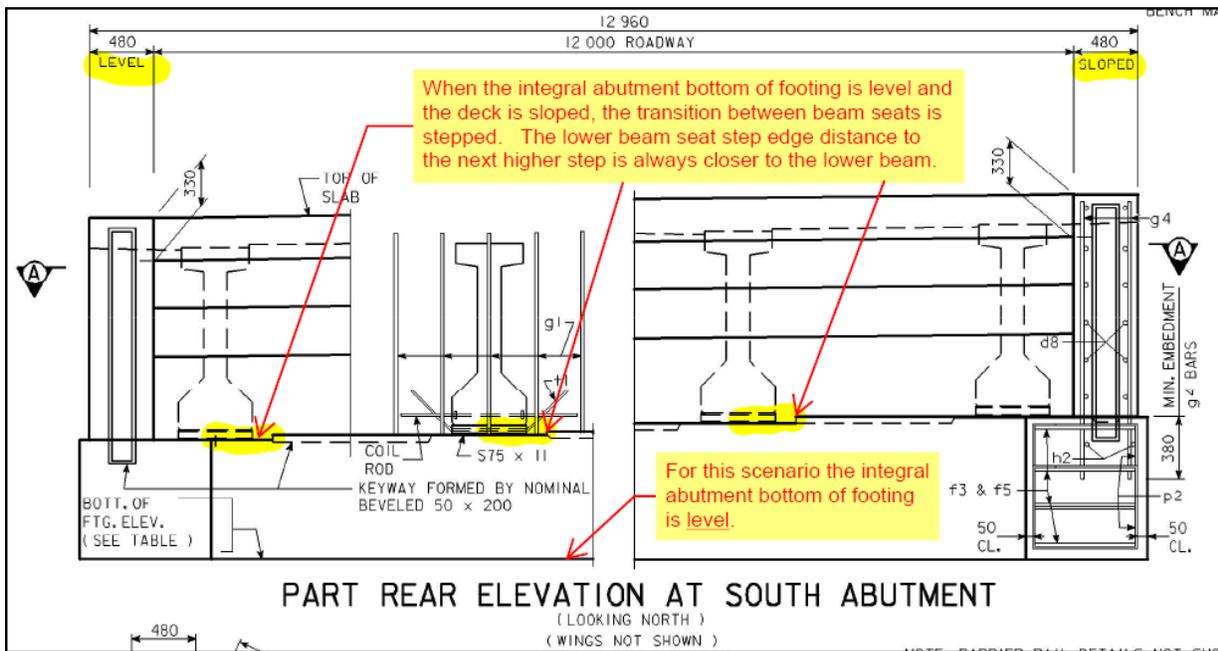
Sloped



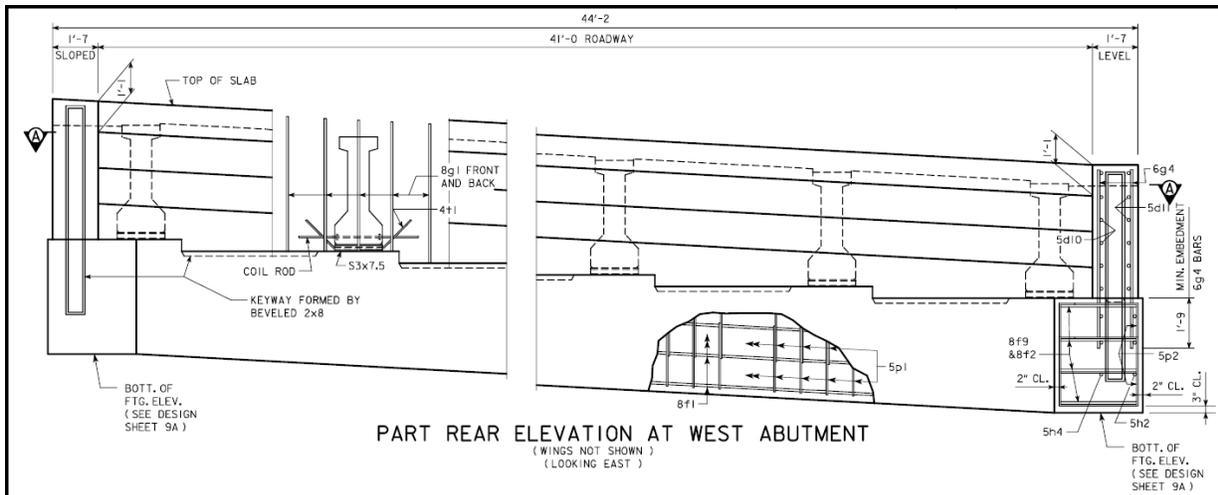
Sloped



Stepped Integral Abutment – Older Past Example



Stepped – Older Past Example



Stepped – Older Past Example

